South Korean President presents awards to Samsung Petrochemical

Our customer, Samsung Petrochemical Company (SPC), recently received two awards from Tae-Woo Roh, who was President of South Korea at the time. The awards were The Outstanding Predictive Maintenance Award and The Outstanding Total Productivity Maintenance Award. The Predictive Maintenance award was based solely on their experience with computerized, on-line vibration information systems, specifically Trendmaster® 2000 (TM2000) and Dynamic Data Manager (DDM).

SPC currently uses DDM to monitor three critical machines and Trendmaster 2000 to monitor 216 general-purpose machinery points. During the two years that these systems have been on-line, they have had more than thirty documented saves.

The second award, the Outstanding Total Productivity Maintenance Award, was based on SPC's productivity in regards to overall plant maintenance and operation. These are the most prestigious awards in each of their categories that the Korean government grants. SPC admits without hesitation that these awards could not have been won without Bently Nevada's outstanding products and the support of Bently Nevada Korea. ■

Back-to-Basics

Attitude Angle versus low rotative speed imbalance response

by Donald E. Bently
Chairman and Chief Executive Officer, Bently Nevada Corporation
President, Bently Rotor Dynamics Research Corporation

Did you notice in the article on Polar-plot balancing (page 5) that the Attitude Angle, due to a steady sideload on a shaft while at rotative speed Ω, is a LEADING phase angle, while the Phase Angle of the High Spot, with respect to the Heavy Spot at low rotative speed Ω below resonance, is a LAGGING Angle? Do you know that these effects come from the SAME TERM of the general rotor dynamics dynamic stiffness equation developed by Bently Rotor Dynamics Research Corporation?

The term is the Quadrature Stiffness term of a seal or bearing (or pump or whatever).

where

$$K_{QB} = j(\omega - \lambda\Omega)D$$

where

K_{QB} is the quadrature dynamic stiffness of the bearing (or seal)

ω is precession frequency in rad/sec

Ω is rotation speed in rad/sec

λ is average fluid circumferential swirling ratio to rotative speed

D is damping (lb sec/in or kg/sec)

For synchronous behavior, $\omega = \Omega$, so the quadrature stiffness of the bearing (or whatever) reduces to $K_{QB\ synch} = +j\Omega D(1-\lambda)$ which causes phase LAG of motion.

For steady state preload, $\omega = 0$, so the quadrature stiffness of the bearing (or whatever) reduces to $K_{QB\ steadystate} = -j\lambda\Omega D$ the "cross stiffness" spring in old literature, usually designated as K_{yx} or K_{xy}. One of these terms is usually shown as negative in value, even though they are identical in a symmetric system.

There are many mysteries yet to be solved in rotor dynamics, but the algorithm for stability is no longer one of them. ■

Photo Contest Winners

The winning entries to our plant sites and equipment photo contest are displayed on our cover. Thanks to all of you who entered.

Plant sites and equipment:

A. & F. Gas-fired power plant, Houston Lighting & Power Company's P.H. Robinson Facility, Bacliff, Texas - Submitted by Thomas J. Stiebler, P.E., Houston Lighting & Power.

B. & E. Coal-fired power plant, Houston Lighting & Power Company's W.A. Parish Facility, Thompsons, Texas Submitted by Thomas J. Stiebler, Houston Lighting & Power.

C. Chevron Canada Ltd's. Burnaby Refinery located on Vancouver's Burrard Inlet - Submitted by Gordon Lind, Machinery Diagnostic Consultant, Dynamic Signal Analysis Corporation.

D. Bently Nevada 3300 Monitors, in a weatherproof housing, which monitor a 600 horsepower steam turbine driving an Induced Draft fan. Waste-to-Energy plant owned by the Region of Hamilton-Wentworth and operated by Laidlaw Technologies Inc. Submitted by John C. Moore, Plant Engineer, Laidlaw Technologies Inc.